

# Narragansett Bay Commission 2018 Monitoring Season Update

## Environmental Monitoring Collaborative Meeting, April 23<sup>rd</sup>, 2019



### Seasonal Nitrogen Loading to Upper Narragansett Bay

- Field's Point and Bucklin Point in compliance with seasonal total nitrogen (TN) permit limits (5 mg/L) throughout 2018:
  - Avg. May–Oct 2018
    - Field's Point = 2.4 mg/L
    - Bucklin Point = 3.2 mg/L
- NBC seasonal 2018 N loadings 84% below 2003 loadings.
- Table at right compares N loading from all major sources to upper Bay pre- (2006 - 2013) and post-nitrogen treatment upgrades (2014 - 2018) at NBC facilities. Overall loadings are down approximately 43.6% compared to the pre-upgrade period.

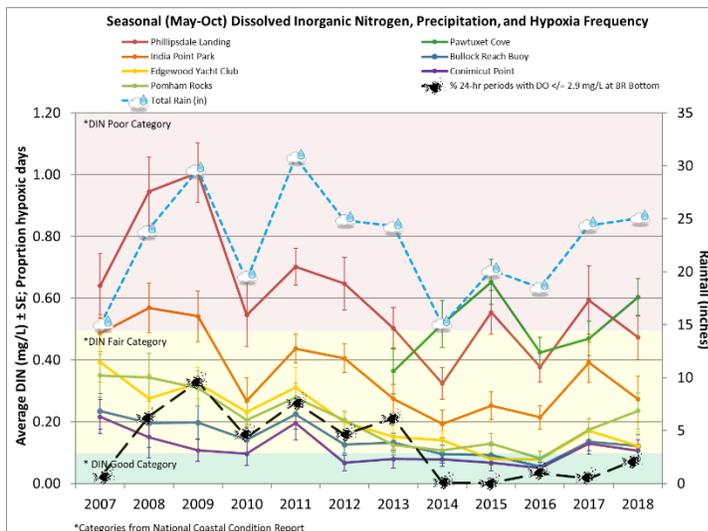
	2006 - 2013 Average	% of Total Loading	2014 - 2018 Average	% of Total loading
	lbs/day	%	lbs/day	%
Bucklin Point	1,143	5.8%	556	5.0%
Field's Point	4,039	20.5%	1,130	10.2%
Blackstone River*	4,426	22.5%	2,285	20.6%
Moshassuck River*	174	0.9%	116	1.0%
Woonasquaket River*	425	2.2%	150	1.4%
Pawtuxet River*	2,156	11.0%	1,165	10.5%
Ten Mile River**	812		202	
East Providence WWTP*	517	2.6%	247	2.2%
Taunton River*	2,692	13.7%	1,348	12.1%
Fall River WWTP	3,227	16.4%	3,281	29.6%
Other Sources TOTAL***	844	4.4%	820	7.4%
Total Contribution	19,668		11,099	

\*River data is Total Dissolved Nitrogen only

\*\*Ten Mile River loading data unavailable for 2018. Historical numbers shown for reference, but excluded from annual totals at this time.

\*\*\*"Other Sources" includes East Greenwich, Bristol, and Warren WWTP.

### Dissolved Inorganic Nitrogen in Upper Narragansett Bay



EPA National Coastal Conditions Report Dissolved Inorganic Nitrogen (DIN)

Thresholds:

POOR	> 0.5 ppm
FAIR	0.1-0.5 ppm
GOOD	< 0.1 ppm

Seasonal (May – Oct) Average:

DIN (ppm) Average	2017	2018
Phillipsdale Landing	0.59	0.47
India Point Park	0.39	0.27
Pomham Rocks	0.17	0.23
Edgewood Yacht Club	0.17	0.12
Pawtuxet Cove	0.47	0.60
Bullock's Reach Buoy	0.14	0.12
Conimicut Point	0.13	0.11

- Most stations in "fair" EPA National Coastal Conditions DIN category.
- Pawtuxet Cove is the site with highest 2018 seasonal average DIN.

## Fixed-Site Seasonal Monitoring

- Bullock Reach, June – November 2018: Fair to good water quality
  - Bottom dissolved oxygen (DO) averaged 4.6 mg/L, hypoxic conditions at the bottom 8.1% of time from May-October.
  - SeaBird HydroCat sondes used (2016-2017), switched to YSI EXO sondes (2018).
- Phillipsdale Landing, February – December 2018: Fair water quality
  - Bottom DO averaged 6.8 mg/L and hypoxic conditions observed 27.8% of time from May-October.
  - New YSI EXO sondes in place for 2019 season.
- East Providence Yacht Club - Seekonk River temporary site implemented June – Nov 2018 to support Regional Ocean Modeling System model development.
- For data: <http://snapshot.narrabay.com/app/Buoys/Export>; new NBC buoy data export site coming soon.



## Bay Fecal Coliform Monitoring

ANNUAL FECAL GEOMETRIC MEAN	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Annual rainfall	45.05	57.37	54.31	42.69	57.09	54.86	53.5	55.49	40.99	45.02	47.18	40.74	38.99	47.74	62.32
Point Street Bridge	2043	2054	3981	845	925	945	439	550	531	408	600	504	533	282	699
India Point Park (CBC)	303	353	255	189	182	117	83	193	95	167	74	52	55	77	198
Collier Point Park	262	349	167	277	387	220	158	208	188	161	149	106	57	124	197
F.P. Outfall	190	245	183	102	159	120	45	134	66	60	36	70	37	47	152
Save the Bay		54	61	75	46	42	37	46	38	34	21	36	16	33	57
South F.P. East	76	84	49	65	78	42	28	44	46	33	34	58	16	27	86
Edgewood Yacht Club	64	67	98	65	55	35	39	48	40	31	16	44	30	30	43
Pawtuxet/Providence Junction		77	157	116	81	59	42	77	69	43	40	52	36	53	67
Gaspee Point At Channel	55	67	70	48	61	30	38	37	64	18	15	39	12	26	46
Bullock Neck	35	16	31	27	23	18	25	25	46	19	14	11	8	16	17
Bullocks Reach Buoy	40	35	71	21	33	31	23	28	37	19	14	19	19	18	15
North of Nayatt Point		14	20	20	21	17	21	25	23	11	11	8	5	14	16
Shawomet		22	43	23	49	23	25	31	31	13	13	14	7	15	19
Conimicut Point	32	27	35	11	23	20	16	20	24	11	9	15	6	16	20

\*Geometric mean = MPN/100 mL

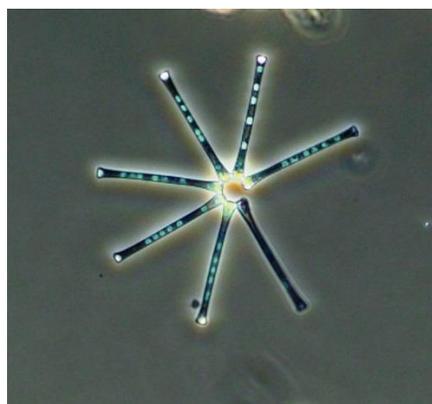
- Down-bay gradient in bacteria levels; average annual fecal coliform concentrations were slightly higher in 2018 than in 2017.
- Added two additional bacteria monitoring sites on the Blackstone in preparation for Phase III of the combined sewer overflow (CSO) abatement project.

## Phytoplankton Monitoring

- Monitor phytoplankton community and obtain phytoplankton counts at the Bullock Reach site
- Twelve sets of phytoplankton samples collected in 2018



200x phase contrast of *Odontella* spp



200x phase contrast of *Thalassionema* spp.

## Benthic Video Monitoring

- Nine successful surveys in 2018.
- No extensive amphipod tube mats observed; their absence is a sign of improved water quality and reduced organic load; fewer areas of extensive *Ulva* rafts observed.
- Dense assemblage of large seastars often observed near Sabin, the pale star at the center of photo is approx. 20 cm (8 in) across!

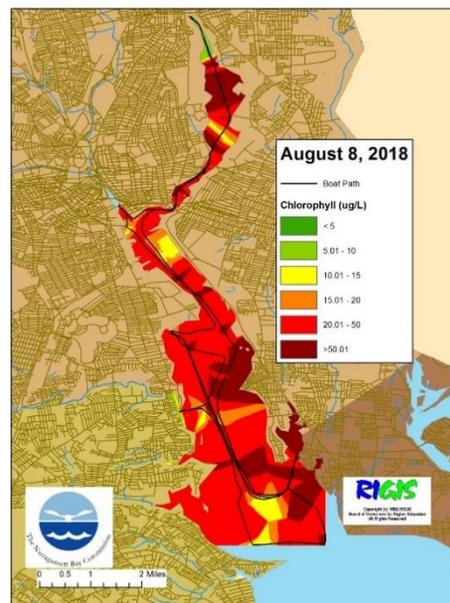
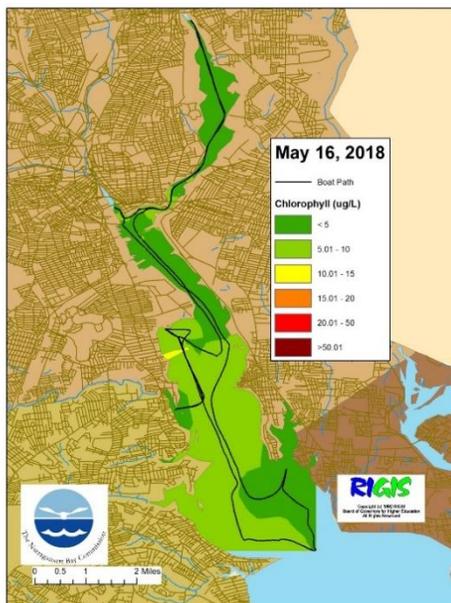
2018 Successful Benthic Video Surveys

	Edgewood	Sabin	Bullock Reach
February	X		X
March		X	
April	X		
August		X	X
October	X	X	X



## Bay Surface Water Quality Mapping

- Surface water quality is mapped throughout the Seekonk and Providence Rivers as the NBC vessel is underway via pumping water to a sonde, which collects data every four seconds.
- Chlorophyll data is analyzed as a proxy for phytoplankton abundance.
- In 2018, surface water quality was mapped on 39 days; highest surface chlorophyll was observed during August 2018.



## Water Column Profiles

- A Seabird HydroCat instrument is used to collect water quality profiles bi-weekly to monthly; 161 profiles were collected in 2018.
- Hypoxic conditions were most prevalent from July-August.

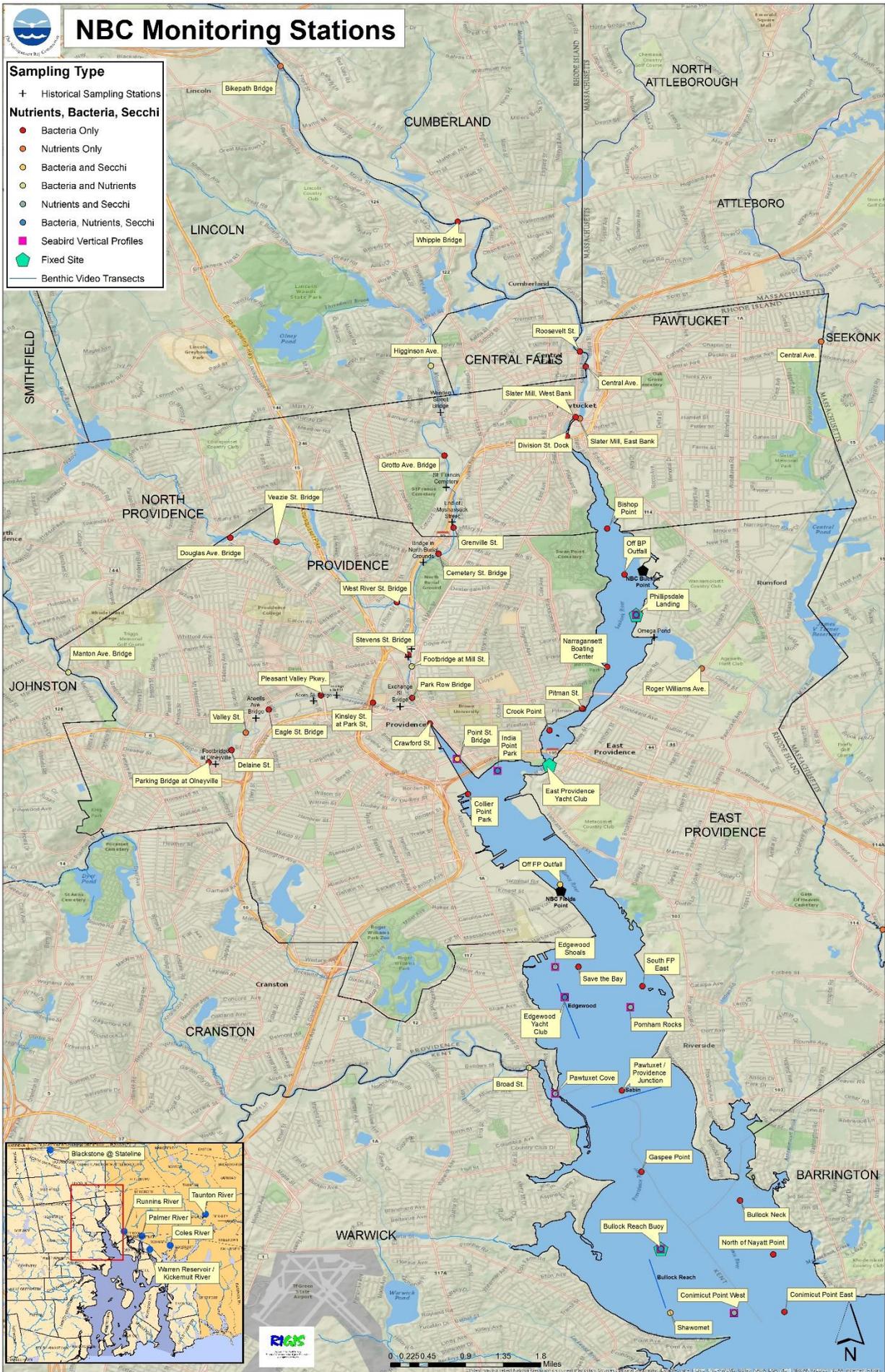
## Water Clarity

- In 2018, NBC collected 234 Secchi depth measurements in the Providence and Seekonk Rivers



# NBC Monitoring Stations

- Sampling Type**
- + Historical Sampling Stations
- Nutrients, Bacteria, Secchi**
- Bacteria Only
  - Nutrients Only
  - Bacteria and Secchi
  - Bacteria and Nutrients
  - Nutrients and Secchi
  - Bacteria, Nutrients, Secchi
  - Seabird Vertical Profiles
  - Fixed Site
  - Benthic Video Transects



0 0.2250.45 0.9 1.35 1.8 Miles

